

## Moles Lab Activity 2: Elements—Aluminum

### Materials

Empty aluminum can  
Balance  
Aluminum foil  
Safety goggles

### Procedure

Take the necessary measurements, and record them with units. Show all your calculations, rounding your answers to the teacher-specified number of significant digits and labeling units clearly.

1. Find and record the mass of one mole of aluminum.
2. Find and record the mass of the aluminum can.
3. Answer the following questions:  
Does the aluminum sample contain more than, less than, or exactly one mole of aluminum?

How many moles of aluminum atoms are in one aluminum can?

How many individual atoms of aluminum are in one aluminum can?

4. Check your answers with the student aluminum experts, and ask them to initial your original data to certify that they are correct.

### Extension

1. How many cans would you need to have one mole of aluminum?
2. Make a “sculpture” out of aluminum foil, using exactly one mole of the foil.

## Moles Lab Activity 2: Elements—Copper

### Materials

Sample of copper  
Balance  
Pre-1982 penny

### Procedure

Take the necessary measurements, and record them with units. Show all your calculations, rounding your answers to the teacher-specified number of significant digits and labeling units clearly.

1. Find and record the molar mass of copper.
2. Find and record the mass of the copper sample.
3. Answer the following questions:  
Does the copper sample contain more than, less than, or exactly one mole of copper?  
  
How many moles of copper atoms are in the copper sample?  
  
How many individual atoms of copper are in the copper sample?
4. Check your answers with the student copper experts, and ask them to initial your original data to certify that they are correct.

### Extension

1. Determine the mass of a pre-1982 penny.
2. Answer the following questions:  
How many moles of copper are in the penny?  
  
How many atoms of copper are in the penny?  
  
How many pennies are needed to make a mole of copper?

Why would these calculations be invalid for post-1982 pennies?

## Moles Lab Activity 2: Elements—Iron

### Materials

10 iron nails  
Balance  
Iron filings  
Small cup  
Magnetic retriever

### Procedure

Take the necessary measurements, and record them with units. Show all your calculations, rounding your answers to the teacher-specified number of significant digits and labeling units clearly.

1. Find and record the molar mass of iron.
2. Find and record the mass of 10 iron nails.
3. Answer the following questions:  
Do 10 nails contain more than, less than, or exactly one mole of iron?  
  
How many moles of iron atoms are in the 10 nails?  
  
How many individual atoms of iron are in the 10 nails?
4. Check your answers with the student iron experts, and ask them to initial your original data to certify that they are correct.

### Extension

1. How many iron nails are needed to get one mole of iron atoms?
2. Pick up some iron filings with the magnet. Scrape these off into a weighing cup, and determine the mass of the collected iron filings. Calculate how many moles of iron filings were collected.
3. Estimate the volume of one mole of iron filings, and describe how you determined this.

## Moles Lab Activity 2: Elements—Sodium

### Materials

Small bag of snack food  
Balance

### Procedure

Take the necessary measurements, and record them with units. Show all your calculations, rounding your answers to the teacher-specified number of significant digits and labeling units clearly.

1. Find and record the molar mass of sodium.
2. Answer the following questions:  
How many mg of sodium are in one serving of snack crackers?  
  
How many g of sodium are in one serving of snack crackers?  
  
How many moles of sodium are in one serving of snack crackers?  
  
How many individual atoms of sodium are in one serving of snack crackers?
3. Check your answers with the student sodium experts, and ask them to initial your original data to certify that they are correct.

### Extension

Healthy American adults should restrict their sodium intake to no more than 2,400 milligrams per day. This is about  $1\frac{1}{4}$  teaspoons of table salt (sodium chloride [NaCl]).

1. Answer the following questions:  
What is the maximum number of moles of sodium recommended in your diet? How many sodium atoms would this be?

If 1 teaspoon salt = 2,000 mg sodium, how many tablespoons of salt would you need to get a mole of sodium? (3 tsp = 1 tbsp)